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GB 2175697 A EP 0631118 A1 EP 0131461 A2

US 4512429 A

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(54) Weighing Apparatus

(57) An electronic weighing apparatus e.g. for items to be posted comprises means for effecting one of a plurality of predetermined gravitational calibration settings in accordance with corresponding predetermined geographical locations, and means enabling a user to input to the apparatus information identifying the location in which the apparatus is employed, whereby the correct calibration setting is effected. As described the calibration settings are in the form of a set of multipliers stored in a look-up table. The selection may be made by scrolling through a list of city codes or by means of a keyboard provided with an overlay in the form of a map.

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FIG. 1

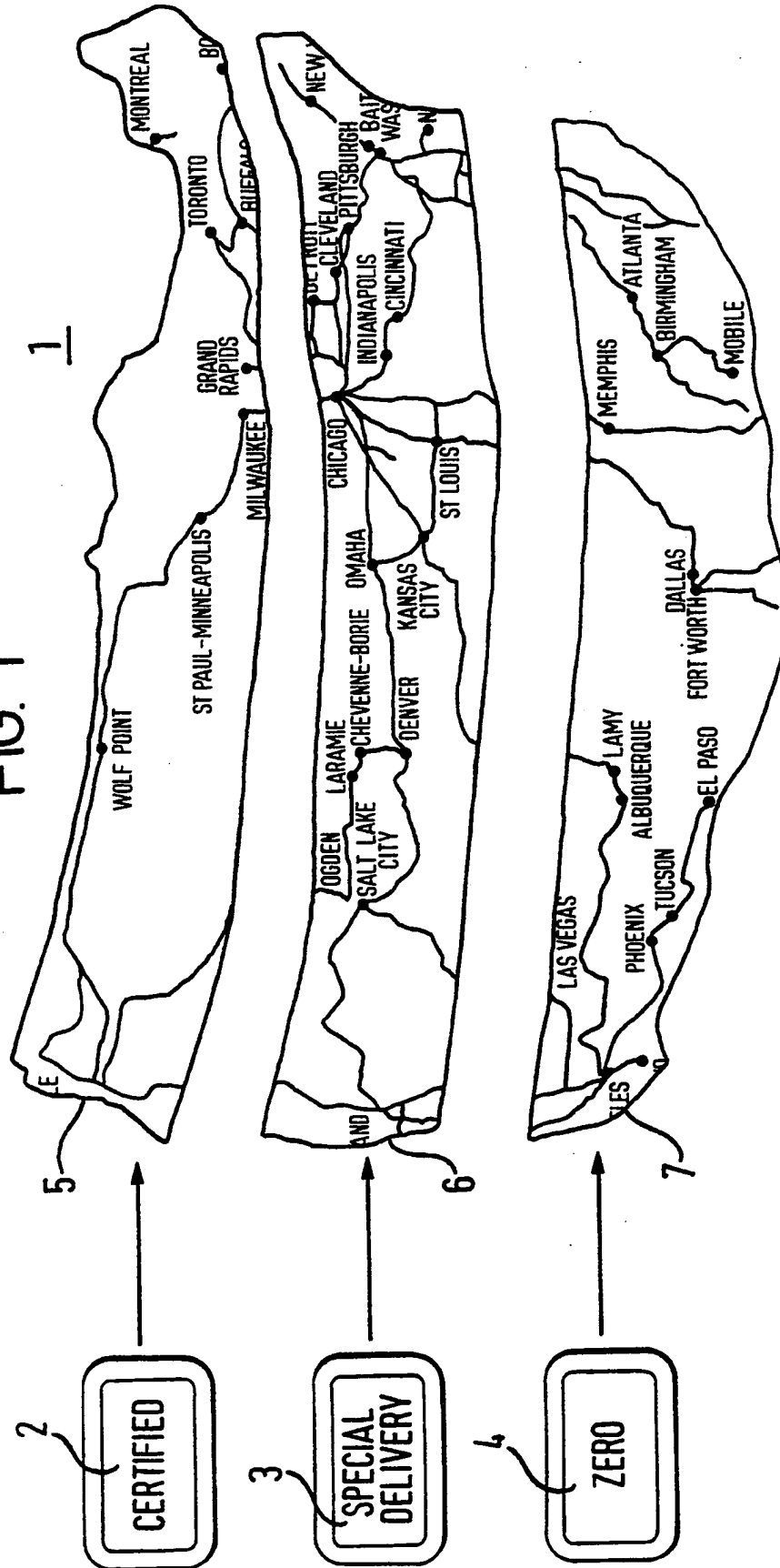


FIG. 2

PLEASE STUDY THE LIST OF CITIES BELOW AND CHOOSE THE ONE NEAREST YOU. THIS WILL GIVE YOU A GRAVITATIONAL CORRECTION CODE TO BE ENTERED AS SHOWN OVERLEAF.

USA

CITY CODE

CITY	CODE
ATLANTA	6 <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
ALBUQUERQUE	6
BALTIMORE	4
CINCINNATI	4

10

11

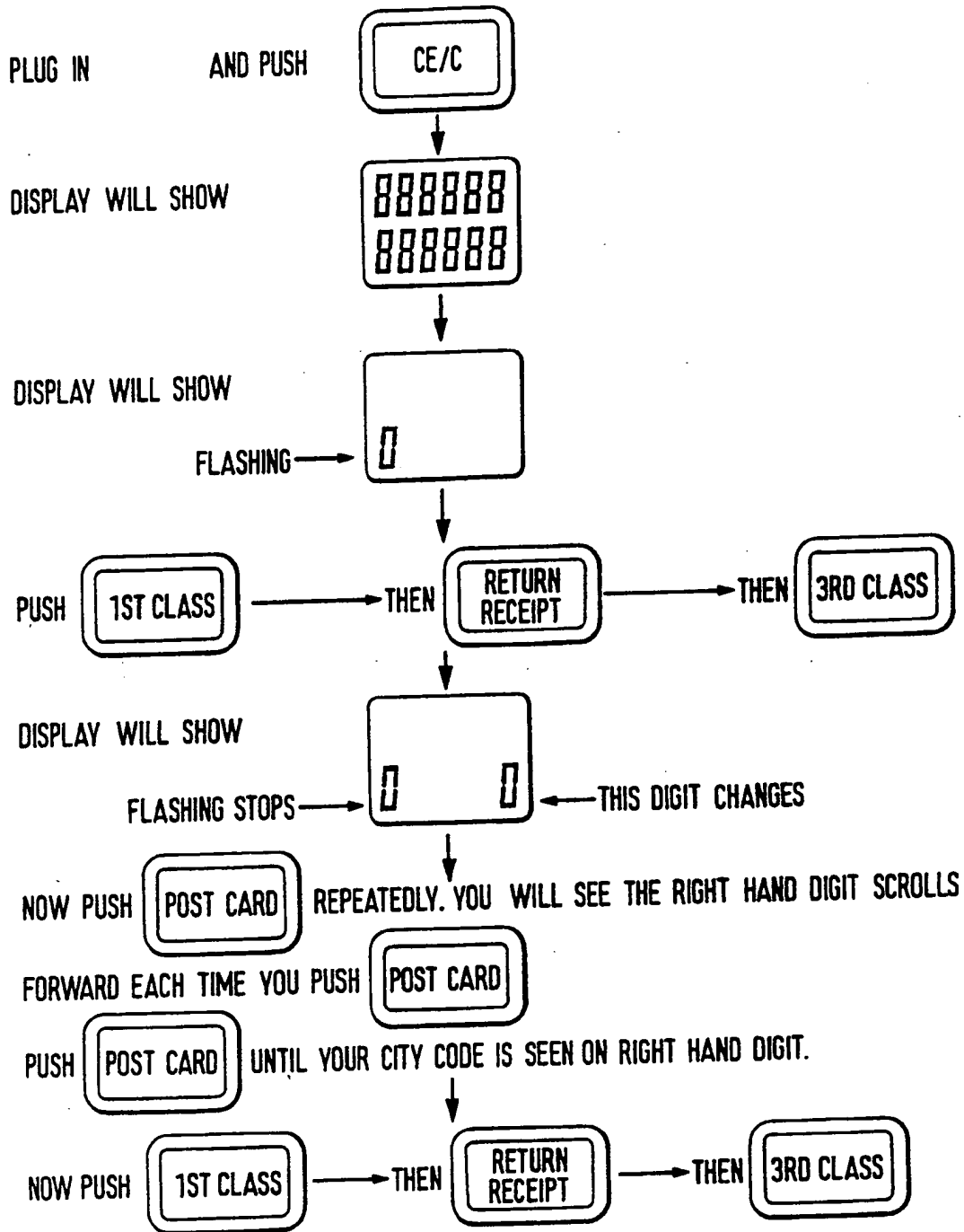


FIG. 3

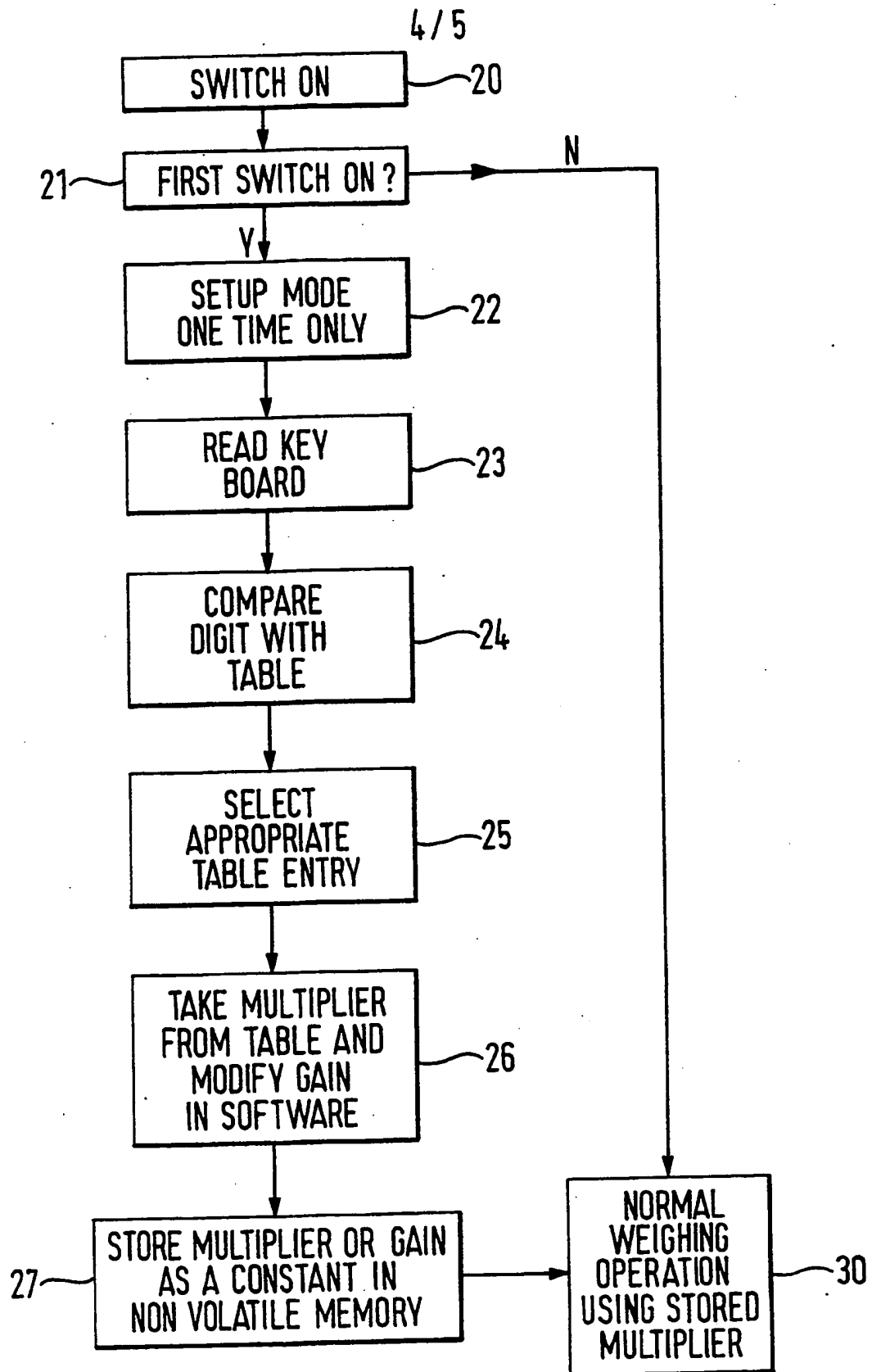


FIG. 4

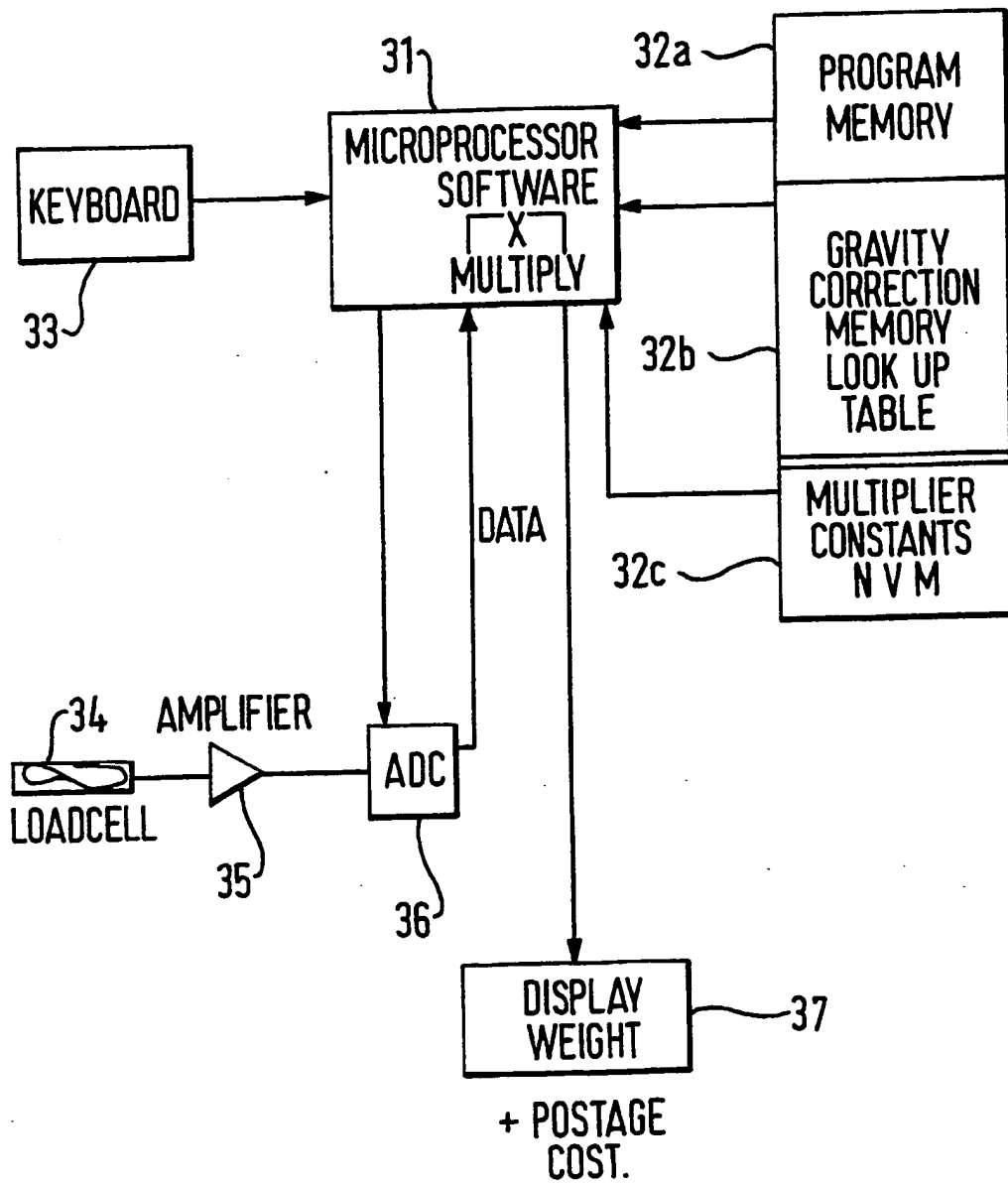


FIG. 5

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WEIGHING APPARATUS

This invention relates to electronic weighing apparatus of all types but is particularly applicable to postal scales and cash counting scales.

Accurate weighing scales require small calibration adjustments as a result of the variable effect of the Earth's gravity which changes dependent on geographic position and other effects. Normally this adjustment is made by a calibration of the weighing machine by a service technician at the location where the machine is used or, alternatively, making an allowance for the change in gravity anticipated at the machines' final destination.

Although this arrangement works effectively, it does have significant drawbacks. The need for a service technician increases the expense involved in commissioning the apparatus, and may also be inconvenient and lead to delays. If the apparatus is calibrated before dispatch, then this leads to greater production costs and to logistical problems since it is then necessary to ensure that specified machines reach the correct destination.

According to the invention there is provided electronic weighing apparatus comprising means for effecting one of a plurality of predetermined gravitational calibration settings in accordance with corresponding predetermined geographical locations, and means enabling a user to input to the apparatus information identifying the location in which the apparatus is employed, whereby the correct calibration setting is effected.

Thus, the requirement for the manufacturer or supplier of the weighing scale to provide a technician to make a local calibration or to make an anticipatory

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divided into calibration zones with a keyboard button being provided for each zone projecting through or adjacent to the overlay. For example, in the case of the United States, a map would be split into between three and ten sectors dependent upon the accuracy of the weighing required. Alternatively, the whole world could be depicted as a map with latitude bands and each band would represent a different calibration setting. The overlay could be permanently affixed to the keyboard, but since the calibration information will only normally be used once, the overlay is preferably removable. This allows the keys or buttons to be used for other functions during the operation of the machine without requiring the confusing presence of a multiplicity of labels for each key or button.

Alternatively there may be a list of postal or ZIP codes with an appropriate key allocated against each. The list may also be provided on a preferably removable overlay and may be arranged such that the postal/zip code for a given location is adjacent the appropriate key. Alternatively, the list may be provided separately, for example in an instruction manual and may provide an indication of which key or key sequence should be used to indicate the location of the apparatus.

Another alternative would be to use the display on the weighing scale to indicate zones or areas with a cross reference against a list of cities. The display may, in this way, indicate which key(s) should be used to indicate the location of the apparatus, or the arrangement may be that the user scrolls through the list until the desired zone or area is displayed.

Preferably, means to prevent errors in data entry would be provided. This could take the form of an additional sequence of button presses to ensure the user repeats or verifies that the data is correct before it is finally entered into non volatile memory.

A convenient way to implement the invention is for the apparatus to be provided with a look-up table provided in memory to give the correction factor in response to a given button push. This factor may then be used to modify a constant stored in memory which, either directly or indirectly, relates an electronic signal produced by a weight transducer in the weighing apparatus to the weight of an item which is being weighed. (The weight may be determined in eg. metric or imperial units, for direct display, or as a parameter used by the apparatus on the basis of which further data, such as the cost of posting the item may be determined).

Certain embodiments of the invention will now be described, by way of example only, and with reference to the accompanying drawings, in which:-

Fig. 1 is a schematic view of an overlay in position over the keyboard of a weighing apparatus according to a first embodiment;

Fig. 2 is an instruction set including cross reference between a list of cities and corresponding calibration codes of a second embodiment;

Fig. 3 is a flow chart illustrating the mode of use of an apparatus according to the second embodiment;

Fig. 4 is a flow chart illustrating the entry of a calibration setting into both embodiments of the invention:

Figure 5 is a block diagram schematically illustrating the main components of both embodiments of the invention.

Turning first to Figure 1 there is illustrated schematically an overlay 1 which may be positioned over a keyboard having buttons 2, 3 and 4 of an electronic weighing apparatus. The overlay is provided with a map of, in this case, the United States of America divided into three calibration zones 5, 6 and 7. Each of these zones corresponds to buttons 2, 3 and 4 respectively.

Before the apparatus may be used for the first time, one of the buttons must be pressed in order to choose the correct gravitational calibration setting for the zone in which the machine is to be used. In order to ensure that the wrong button is not pressed accidentally, it is necessary to press the appropriate button four times. Following this, the apparatus reverts to the usual weighing mode. The overlay may be removed from the keyboard and the buttons 2, 3 and 4 may be used for other purposes.

As an alternative to the above system, in a second embodiment the apparatus is supplied with a list of cities 10, followed by a series of corresponding codes 11. Before the apparatus may be used, for the first time it must be calibrated according to the flow chart of Figure 3. Thus, after certain initial button presses as illustrated in the flow chart, the appropriate code 11 is entered into the machine. This is done by scrolling through the list of possible codes until the desired one is reached. Further button presses set this code in memory and the subsequent operation of the weighing apparatus uses a gravitational calibration value obtained from a look-up table stored in memory which corresponds to the code selected.

Figure 4 illustrates the calibration of an apparatus by means of a flow chart. Starting from box 20, the switch-on of the machine is detected and the calibration sequence is started. Then, at decision box 21, if the machine is being switched on for the second or subsequent time (ie. it is already callibrated), then no calibration is required and the apparatus may be used immediately (box 30). However, if no calibration has been made, then the apparatus proceeds in set-up mode (box 22). The keyboard is read (box 23) until a suitable input is made. Then, the input is compared with values stored in a look-up table (box 24). When the current value is found, the corresponding

calibration factor "multiplier" is taken from the table (box 25). This is then used to modify the "gain" constant used by the machine's software to translate the signal from a weight transducer (eg. a loadcell) into useful data (box 26). The resulting modified gain constant is then stored in non-volatile memory (box 27). Subsequently, the apparatus may be operated in the conventional manner (box 30).

The main components of the apparatus are shown in block-diagram form in Figure 5. The operation of the apparatus is controlled by microprocessor 31 which runs a program stored in Program Memory 32a. The microprocessor reads the keyboard and when a calibration input is made, accesses a look-up table stored in memory 32b. This provides the gain constant which is stored in non volatile memory 32c.

Subsequently, when the apparatus is used, loadcell 34 provides an analogue signal which is amplified by amplifier 35 before being fed to Analog to Digital Convertor 36. The microprocessor 31 then multiplies the resulting digital data by the gain constant stored in memory 32c, and the resultant weight value is displayed by display 37. If required, further calculation steps may be performed by the microprocessor, eg. to provide a display in terms of postage cost.

7. Apparatus as claimed in claim 6, wherein the correction factor is used to derive a gravitational calibration constant which is stored in non-volatile memory.

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Examiner's report to the Comptroller under Section 17 -9-
(The Search report)

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Relevant Technical Fields

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(ii) Int Cl (Ed.6) G01G 23/01

Search Examiner
M G CLARKE

Date of completion of Search
29 JUNE 1995

Databases (see below)

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-
1 TO 7

- (ii) ONLINE: WPI

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- A:** Document indicating technological background and/or state of the art. **&:** Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2175697 A	(MPI) whole document	1, 6 at least
X,P	EP 0631118 A1	(METTLER-TOLEDO) see especially Claims 1 and 4	1
X	EP 0131461 A2	(K K ISHIDA KOKI) see especially page 27 line 22 to page 30 line 21	1, 6 at least
X	US 4512429	(ASS TO METTLER INSTRUMENTS) whole document	1, 6 at least

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